

**ORDER**

6110.5

CAEG Implementation Plan



August 30, 1988

**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION**



## FOREWORD

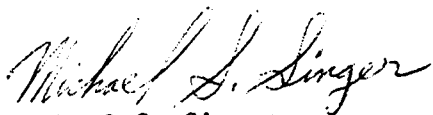
This order provides management direction and technical guidelines for the implementation of a Computer Aided Engineering Graphics (CAEG) system at designated user sites. This project is directed toward the establishment of computer aided graphics at all Federal Aviation Administration (FAA) regional offices for use by Airway Facilities, Air Traffic, Flight Standards, Aircraft Certification, Airports, Logistics, and Management Systems.

The plan was prepared under the direction of the FAA project manager (AAF-4B) who will review it frequently and coordinate revisions as necessary.

The plan has been kept broad in scope in order to be a practical working tool. It is designed to encourage the interactive coordination of information between the FAA headquarters, regions, centers, and all other project participants. It permits noncontractual judgments and determinations to be made by all participants as conditions warrant.

This order provides a mechanism whereby important issues such as CAEG relocation plans, FAA wide CAEG standards, contractor exchange protocols, and regional implementation plans may be addressed under separate cover at a later time as additions to this order. Subsequent updates are imperative and will require a substantial effort.

Implementation and use of CAEG in FAA will directly affect the way 1,200 employees perform their job assignments. Once the system is operational, an interdisciplinary approach to management is required. A management structure must be established and supported to resolve disputes that develop within and between organizations. The management structure must provide a vehicle to coordinate system downtime, set priorities, and approve production schedules. Headquarters, regional, and center directors along with division managers must work hard to encourage sharing of information, designs, and collaboration on work efforts. Graphics automation benefits will only happen when the management structure directs open and free exchange of information. MANAGEMENT role in CAEG must be aggressive to realize the potential benefits available. The program will not be successful with ancillary management.



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Manager, Systems Engineering Staff



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## CHAPTER 1. GENERAL

1. PURPOSE. This order establishes a Project Implementation Plan (PIP) for the Computer Aided Engineering Graphics (CAEG) Program. Its primary purpose is to provide guidance for personnel located at headquarters and in the centers and regions who are directly involved in the acquisition, deployment, and logistical support aspects of CAEG systems. The PIP specifies the expected life-cycle path for CAEG systems in terms of work to be done, when it is to be done, by whom it is to be done, the available resources, and the resources required to proceed to any point in the cycle.

2. DISTRIBUTION. This order is distributed to the division level in Washington, regions and centers, and to the branch level in regions and centers.

3. BACKGROUND. The CAEG Program began as a special workgroup formed as a result of the advent of the FAA's Information Resource Management Plan (IRMP) in 1983. Many computer aided design/graphic projects were included in the various systems submitted by organizations as part of the IRMP. The Administrator asked that a workgroup be formed to look at across-the-board graphics requirements and that the workgroup provide recommended actions to fulfill the requirements. The outcome was the FAA's Comprehensive Graphics Plan which identified many program areas with graphic-related requirements and a recommendation, subsequently implemented in 1984, to install three off-the-shelf computer aided engineering graphics systems in three regions (Eastern, Southern, and New England). These systems were operated by the Airway Facilities Division in Southern, Airports Division in Eastern, and Management Systems Division in New England. In 1985 a report was issued that concluded the feasibility and cost effectiveness of a system for the FAA. At that time, requirements and specifications were written and the project was approved. Subsequently, a request for proposal (RFP) was issued and proposals received and evaluated. In May 1988 a report was sent to the source selection official (SSO) advising of the results of the proposals and evaluations.

4. MODIFICATIONS AND CHANGES TO THIS ORDER. Modifications to the plan in the form of changes, corrections, and/or additions should be submitted to Configuration Management and System Design Staff, AAF-4B. The Manager, Systems Engineering Staff, AAF-4, may issue changes to this order.

5. RESPONSIBILITIES. (Reserved)

6.-19. RESERVED.



## CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS. The CAEG Program, to be implemented by this order, is a result of a program formed from the requirements taken from the FAA's Comprehensive Graphics Plan, May 1983. The Plan identified the need for automated assistance to ensure that the agency's graphics and related projects, 14 of which were identified, could be accomplished within projected personnel resource limitations. The identified projects span all the agency's organizations although emphasis is placed on areas which offer the greatest return on investment (ROI) and which also require the largest investment. The initial program pointed toward business and management graphics (an administrative system) but the original graphics workgroup (GWG) quickly identified other areas that perhaps will receive the most utility from a computer aided system. These items were grouped/combined and the CAEG was initiated as a project line item in the National Airspace System (NAS) Plan under Chapter 6, Project 16, General Maintenance, although the CAEG will be a general use system for FAA-wide organizational use. To date, the following activities have been accomplished.

- a. Requirements identification - 1983.
- b. Prototype systems installed, tested, and evaluated - 1984-85.
- c. Decisions to proceed with a national system - 1985.
- d. Program office and funding identified - 1985.
- e. System Specifications - 1986.
- f. Request for Proposal (RFP) to industry - 1986.
- g. Receipt of Proposals/Evaluation of Proposals - 1987.
- h. Technical Evaluations/Demonstrations/Report - 1987.
- i. Source Evaluation Board (SEB) Report to Selection Official - 1988.

21. PURPOSE. The CAEG project is designed to provide automated graphical applications support to FAA organizations and this order serves the primary purpose of identifying the requirements for installation, implementation, training, maintenance, and operation of the initial systems in headquarters, the regions, and the two centers. The data that is provided reflects the status and planning as of the publication date.

22. PROJECT OVERVIEW. This project will direct efforts to channel graphics projects within the FAA into a uniform graphics system at each region, the Aeronautical Center, the FAA Technical Center, and headquarters. Each region will be provided with a CAEG system which will consist of data storage facilities, intelligent graphics workstations, plotters, printers, and terminals. The equipment will be interconnected to either a file server or a host computer which will provide an operating system, system support software, and data base management software. Application software packages are included to facilitate the work of selected functional areas. The Aeronautical Center, FAA Technical Center, and headquarters will be furnished the pilot systems that are now installed in the Southern, Eastern, and New England Regions. These CAEG systems consist of data storage facilities, intelligent graphics workstations, plotters, printers, and terminals interconnected through a host computer along with an operating system support software, and data base management software. The pilot systems were acquired to evaluate the feasibility of using computer graphics in FAA and were not designed with the capacity or configuration needed to meet the total requirements of any location. Establishment of computer graphics in the centers and headquarters was not within the scope of this project, therefore only partial satisfaction of their requirements will be met with the pilot systems. The regional systems will be supplied as turnkey installations by the successful bidder with initial delivery of a basic configuration. There is an expanded configuration option in the procurement request which allows the FAA to exercise, in whole or in part, procurement of additional hardware and software. Initial training and first year maintenance are included in the scope of project funding and the procurement allows subsequent yearly options for maintenance and training during the 60-month period of the proposed contract. The composition of the basic and expanded configurations are defined in system specification FAA-E-2771.

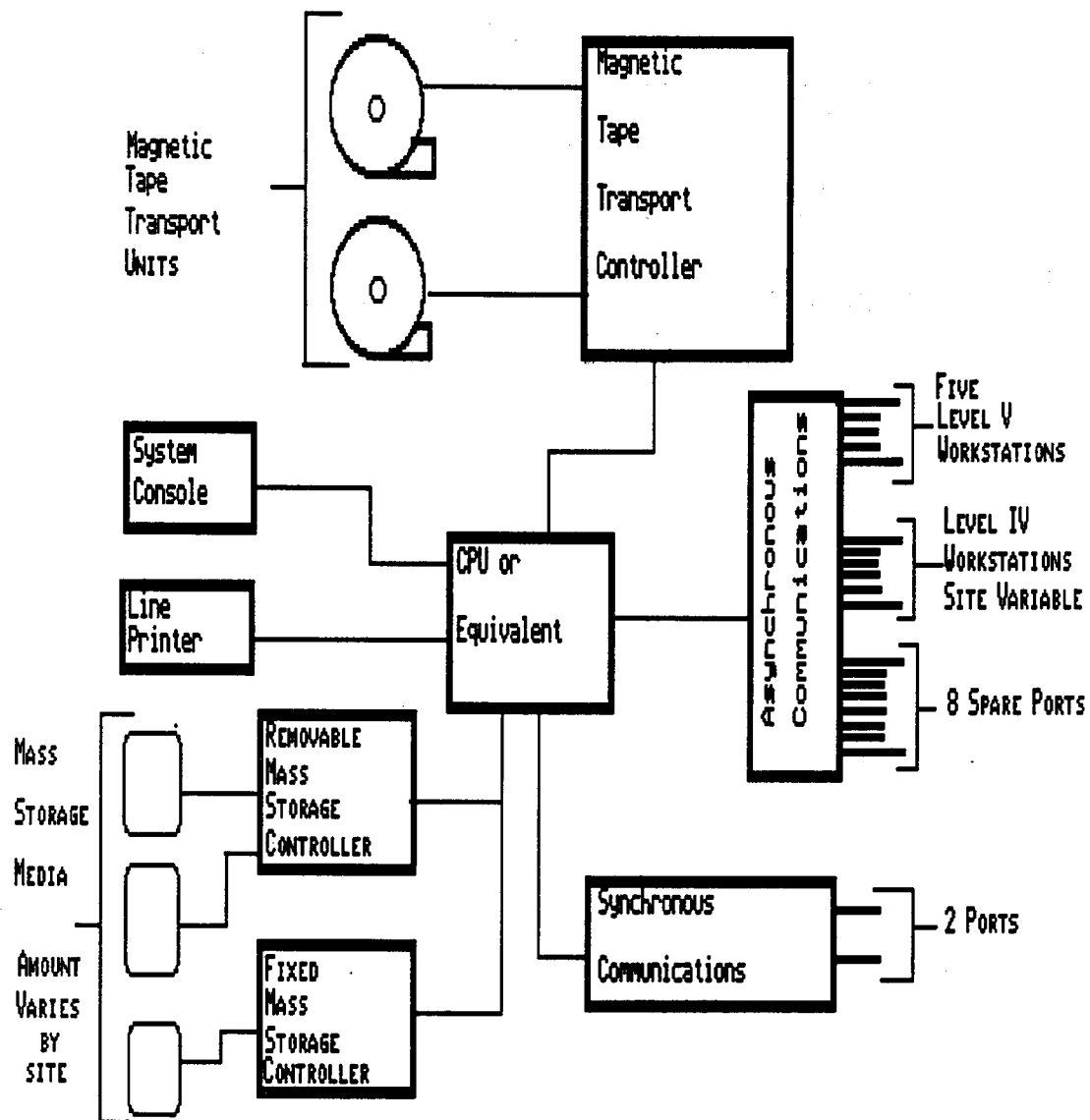
23.-29. RESERVED.

## CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION. The CAEG Program is a suite of hardware, software, firmware, and related workspace furniture that will provide the users the support required to process and analyze various functionally oriented data in FAA organizations. Some uses of the system: development and modification of engineering designs for facilities/equipment related to NAS Plan implementation; obstruction evaluation and airport airspace analysis (OE/AAA) processing; integrated noise models development and analysis; space management; aircraft/engine certification analysis; storage/retrieval of contractors' drawings and/or data; and general management business graphics. Various data will be entered and accessed via communication channels (ports) to and from the user organization. A generic system configuration is shown in figure 3-1, System Hardware Configuration.

31. PHYSICAL DESCRIPTION. The physical description will be provided in a change to this order when a contractor has been selected and the contract is awarded.

FIGURE 3-1. SYSTEM HARDWARE CONFIGURATION



32. SYSTEM REQUIREMENTS. Until a contract is awarded, the following general requirements may be used for planning purposes. Once a selection is made, more exact measurements will be provided through a change to this order.

a. Two hundred (200) square feet in the conditioned environment of a central computer room for a central processing unit (CPU), disk drives, printer, tape drive, related auxiliary equipment/furniture, and tape and disk storage.

b. One hundred and thirty-five (135) square feet per system workstation and auxiliary equipment in personnel work area.

c. Appendix 1, Typical CAEG System Requirements, provides some typical system dimensions, power requirements, and heat loading for air conditioning requirements.

d. The CAEG will be installed in areas that comply with the operational environmental conditions required by the manufacturer/contractor.

e. Cabling will be furnished by the contractor; each site must pull (install) cables.

33. INTERFACES. The CAEG system will provide interfacing capabilities as described in the system specification, FAA-E-2771, including any and all revisions. Special situations and considerations will be provided as required before installation.

34.-39. RESERVED.



## CHAPTER 4. PROJECT SCHEDULES AND GENERAL STATUS

40. PROJECT SCHEDULES AND GENERAL STATUS. Schedules will be developed and maintained in varying detail by the program office and provided to the associate program managers once a contract is awarded. The following data table is provided to alert recipients of typical timing once a contract has been awarded. T = target date. T+X = target date + cumulative days.

<u>Milestones</u>	<u>Schedule</u>
Contract Award	T
Site Surveys	T + 7 (begin 1st Site) <sup>1</sup>
Site Preparation	T + 28 (begin 1st Site) <sup>1</sup>
Equipment Delivery	T + 90 (1st Site) <sup>2</sup>
Installation	T + 120 (finish 1st Site)
Acceptance Testing	T + 120 (begin 1st Site)
Training	T + 3

NOTE:

- 1 Contractor will provide actual scheduling for second thru ninth sites.
- 2 Contractor will deliver subsequent systems at 30-day intervals;  
i. e., second site = T + 120, 3rd site = T + 150, etc.
- 3 As proposed and negotiated.

41. MILESTONE SCHEDULE SUMMARY. The FAA's strategy for fulfilling the program's pre-1990 objectives centers on an evolutionary approach whereby initial CAEG systems are acquired and configured conservatively to stay within the initial budgetary constraint. For purposes of identification, these initial baseline systems are denoted as B(0). The B(0) systems will then be upgraded in an evolutionary manner constrained by available funds. This strategy is a 3-tier implementation process, the first tier yielding all subsequent baselines, some of which would be site or regionally unique in a configuration sense.

a. The major events in the pilot systems line are initial purchase, then relocation and finally enhancements and upgrading. Completion of this work is scheduled for FY 1989.

b. Acquisition of the nine regional CAEG systems is for off-the-shelf hardware and software and the support of the systems thereafter. Because of funding restrictions and the time required to acquire and implement systems of this complexity, acquisition of these systems are planned for completion to the B(1) configuration level in FY 1989. Further enhancements to the B(1) configuration level will be the responsibility of the user organization.

c. Special application software design and acquisition constitutes the third activity. Because of the nature of this activity, it is projected to be open ended in a scheduled sense. It is anticipated that a series of special application software will be specified, and their development and implementation will be evolutionary and a continuing process.

42.-49. RESERVED.

## CHAPTER 5. PROJECT MANAGEMENT

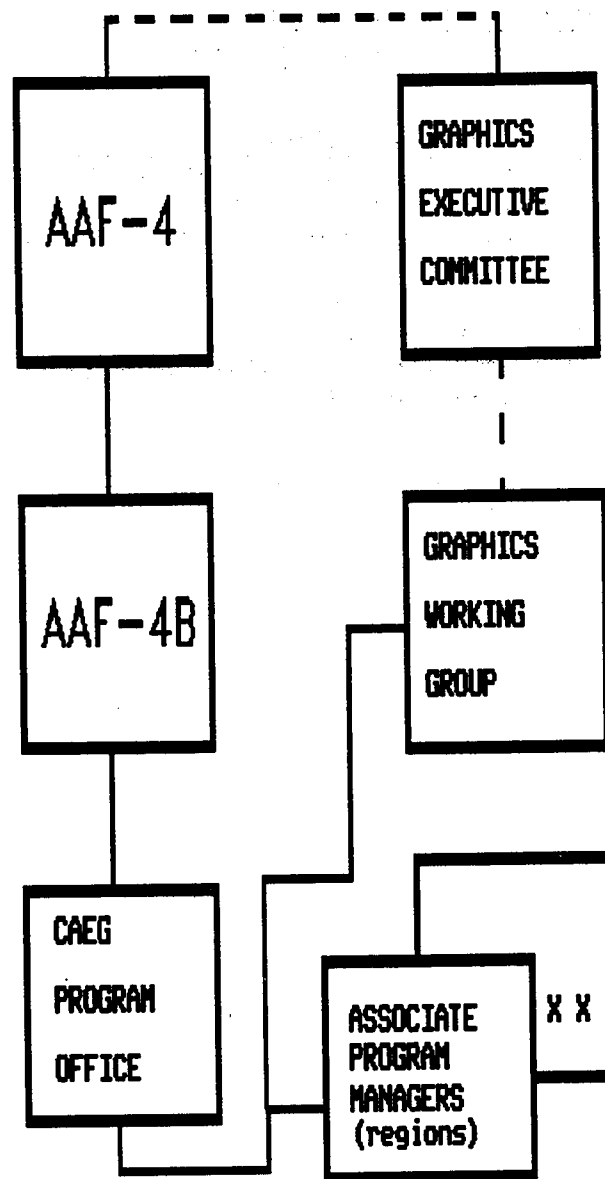
50. PROJECT MANAGEMENT, GENERAL.

a. Figure 5-1, CAEG Program Organization Structure, illustrates the CAEG Program organization structure.

b. The CAEG Program Office is supported by the GWG on technical matters. Overall policy and management guidance is provided to AES and the program office by the graphics executive committee (GEC).

c. Each of the FAA's nine regions, the Aeronautical Center, and Technical Center has named an Associate Program Manager (APM), supporting the CAEG Program Office on matters relating to the region represented. Paragraph 51 lists the assigned Associate Program Managers and the GEC and the GWG memberships.

d. The CAEG Program Office will obtain special technical and administrative support from the Transportation Systems Center (TSC), and the Acquisition and Materiel Service (ALG).

FIGURE 5-1 CAEG PROGRAM ORGANIZATION STRUCTURE

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51. PROJECT CONTACTS. This paragraph contains listings of project management personnel designated as contacts for their respective organizations.

a. Associate Program Managers (APM) for Computer Aided Engineering Graphics:

AAC  
Dr. Mark Lewis  
FTS 747-4226

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AAL  
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ACE  
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AEA  
Tom Behrens  
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AGL  
Bill Thomas  
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ASW  
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AWP  
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Lawndale, CA 90261

ACT  
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Atlantic City Airport, NY 08405

b. Membership of Graphics Executive Committee (GEC), Computer Aided Engineering Graphics:

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AND-1  
Arnold Aquilano  
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Mr. Arnold Aquilano  
Federal Aviation Administration  
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c. Current membership of the Graphics Working Group (GWG):

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Mike Monroney Aeronautical Center  
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ASW  
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AMS  
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Washington, DC 20591

AAS  
Mike Harrison  
FTS 267-8733

Federal Aviation Administration  
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Washington, DC 20591

AAF  
Chuck Pilgrim  
FTS 267-9823

Federal Aviation Administration  
ATTN: Chuck Pilgrim, AAF-4B  
800 Independence Avenue, SW.  
Washington, DC 20591

AAF  
Mark Levy  
FTS 267-9793

Federal Aviation Administration  
ATTN: Mark Levy, AAF-4B  
800 Independence Avenue, SW.  
Washington, DC 20591

TSC  
Walter Messcher  
FTS 837-2481

Transportation Systems Center (TSC)  
ATTN: DTS 15  
Cambridge, MA 02142

52. PROJECT COORDINATION. This paragraph lists CAEG project organizational elements requiring coordination. Coordination requirements are summarized for each element.

a. CAEG Program Office. The CAEG Program Office is responsible for managing the CAEG Program in accordance with this order and its future updates. This responsibility has been assigned to the AAF-4B Program Office through the organizational chain of command shown in figure 5-1. The primary areas of program office responsibility include schedule and cost control, assuring system integrity, coordination and liaison with field and contractor organizations, initiating and processing funding requests, initiating and directing procurement activities, briefing and reporting to upper management, and tasking and monitoring the work of participating organizations. The authority delegated to the program office is vested in the hands of the program manager and includes:

- (1) Control over the commitment of all appropriated CAEG funds.
- (2) Decision control over any schedule, budget, or requirements changes in the CAEG Program (subject to higher management review and/or approval).
- (3) Subordinate and contractor performance assessments.
- (4) Coordination and direction of CAEG-related activities to the project staff, GWG, and regional associate program managers.
- (5) Assignment of priority over all CAEG development and implementation tasks, including installation priorities, configuration levels, and handling program contingencies.
- (6) Special assignments to assist the program office will be made to the regions.

b. Graphics Executive Committee (GEC) Charter. The GEC has been established to provide management oversight, coordination, and leadership on the FAA's graphic projects defined in the IRMP. The GEC is composed of membership at the level of deputy associate administrators, regional directors/deputies and service directors/deputies. This plan assumes that the GEC chooses its own chairman and establishes its own priorities with respect to CAEG matters. There are currently eight FAA managers tasked to participate as members of the GEC. Paragraph 51, Project Contacts, lists the GEC's current membership. The GEC's charter relative to the CAEG Program includes but is not limited to:

- (1) Review and approve management plans originating with the CAEG Program Office, including this order.

(2) Review and monitor program progress in accordance with an approved implementation plan.

(3) Monitor the participation of the FAA regional organizations and other participating FAA organizations.

(4) Review and approve requests for funding and major procurement decisions.

(5) Task AES and the program office to develop plans and recommendations relating to current and future CAEG program activities.

(6) Interface directly with the GWG to attain and maintain an independent view of the CAEG Program and its status.

c. Graphics Working Group (GWG) Charter. The GWG was initially established as the technical operational arm of the GEC. Paragraph 51, Project Contacts, lists the GWG's current membership. For the CAEG Program, the GWG is expected to operate in a dual capacity.

(1) Continue to be responsible to the GEC, primarily as an independent technical advisor and evaluator of the CAEG Program. In its independent capacity, the GWG remains responsible to the GEC on the graphics matters that do not fall within the purview of the CAEG Program.

(2) Perform as a technical arm of the program office responsible for tasks assigned by the program office. The GWG's charter in the context of the CAEG Program includes:

(a) Recommending agency technical policies concerning graphics standards, interchange specifications, and long-range plans for realizing device independent standards for CAEG systems.

(b) Providing a technical forum for synthesizing and coordinating among the FAA's vested interested groups on matters relating to CAEG systems.

(c) Providing direct technical advice and support to the CAEG Program Office and/or end users when tasked by the program manager.

(d) Contributing to and reviewing specifications of CAEG systems developed during the acquisition process.

(e) Conducting and/or participating in feasibility studies, particularly with respect to additional application software and long range evaluation of CAEG systems within the FAA.

(f) Providing recommendations to the program office (and GEC) on new graphics initiatives having substance because of emerging technology and/or new requirements.

(g) Preparing reports as required in response to CAEG tasks assigned by the program manager.

53. PROJECT RESPONSIBILITY. This paragraph shows the organization and/or FAA level responsible for implementation of each significant function of the CAEG project.

#### WORK STRUCTURE ITEM

#### ORGANIZATIONAL RESPONSIBILITY

1.0 Program Management	AAF-4B
1.1 Funding Requests	AAF-4B
1.2 Planning	AAF-4B
1.3 Scheduling	AAF-4B
1.4 Resource Alloc. & Cont.	AAF-4B
1.5 Conf. Management	AAF-4B
1.6 System Assurance	AAF-4B/GWG
1.7 Liaison & Reporting	AAF-4B
1.8 Management Training	AAF-4B/Regions
1.9 I&O Plans	AAF-4B/Regions (Associate Program Manager)
2.0 CAEG Program Acquisition	AAF/ALG
2.1 Specif. Preparation	AAF-4B/ALG
2.2 Source Selection	AAF/ALG
2.3 Contract Management	AAF/ALG

## WORK STRUCTURE ITEM

## ORGANIZATIONAL RESPONSIBILITY

## 3.0 Special Applic. Soft. Acquisition

3.1 Feas. Studies and Analysis

GWG/TSC

3.2 Specif. Preparation

GWG/TSC/Regional Prog. Mgrs

3.3 Source Selection

AAF/ALG/AOA

3.4 Contract Management

AAF/ALG

## 4.0 Pilot Systems

4.1 Intergraph Purchase

AAF/ALG

4.2 Further Oper. Evaluation

GWG/Host Regions

4.3 Relocation

AAF-4B/Host receiving orgs.

4.4 Relocation Support

AAF-4B/Intergraph

4.5 Upgrade

AAF-4B/Host receiving orgs.

## 5.0 CAEG Contract (9 systems)

Contractor to be chosen

5.1 1st Conf. Level Deliveries

5.2 System Docum. &amp; Soft.

5.3 Training

5.4 Maintenance

5.5 2nd Tier Conf. Deliveries

5.6 Other Options

## 6.0 Special Appl. Soft. Contract(s)

Contractor(s) to be chosen

6.1 Package 1

6.2 Package 2

6.3 \_\_\_\_ Package n

54. PROJECT MANAGEMENT COMMUNICATIONS. To effect management control of schedules, cost, and technical aspects of the CAEG project, the program office will impose the following requirements affecting all participating organizations:

a. Quarterly project reviews chaired by the program manager in accordance with an agenda issued 10 days before the review. Quarterly reviews will be conducted at FAA headquarters during the first week of the quarter. Minutes and action items are to be prepared and issued after each review by the program manager.

b. The program office will task GWG during the last quarter of each fiscal year to provide a written appraisal of the project and the contributions of participating organizations, including contractors.

c. Each participating organization will be required to provide a written, formal monthly report to the program office that shows PROGRESS AGAINST TASKING AND MILESTONES. In the case of TSC this reporting requirement will include resource expenditures and personnel assignments.

d. Annually, the program manager will prepare a written assessment of the performance of each participating organization and submit same to AAF-4 and to cognizant manager of the participating organization. Information copies will be provided to the associate program managers.

e. AAF-4 will assess CAEG program management performance in accordance with this order and annual updates of it hereafter.

f. The assigned program manager for CAEG will be a member of the SEB on all CAEG procurements. He/she will also serve as a member of the Specification Review Board (SRB) in the support of its function to fulfill configuration management requirements for CAEG in accordance with Order 1800.8E, National Airspace System Configuration Management.

g. The program office will provide guidance for each region to develop an installation and operating plan as a prerequisite to delivery of a system. Review by the program office will be required prior to approval by the Regional Director or designated representative.

h. The program office will update this order plan on an annual basis as a means of communicating the status and direction of the program. A scheduled update will force the project to be reexamined by FAA management each year, especially in terms of schedules, resource availability and commitments, organizations roles, program control, and progress toward meeting objectives.

i. The CAEG Program is a Presidential Productivity Improvement Program and each APM will be required to provide data relating to productivity improvement that is the result of CAEG implementation. The program office will advise on the type of data required in reporting productivity improvement to the Office of Management and Budget.

55. IMPLEMENTATION STAFFING. The contractor is tasked to install and make operational each system. During the installation and acceptance phases, each APM will provide FAA personnel to assist these phases. Each site will require a full-time CAEG system manager and a regional user/work group. During implementation, these personnel will be used to accept and test the newly installed system. When operational, the APM and the system manager will be responsible for the total management of the system, working with representatives designated by the various user organizations. The APM will continue to be responsible for remaining items necessary to complete the implementation. The user organization representatives will be responsible for system use/operation in their respective organizations. The time required to be dedicated to the CAEG will vary by use(s) and organization. The CAEG system manager will hold overall responsibility to ensure system integrity. The functions of the APM's are to direct the establishment of policy, initiate and direct budget requirements, and serve as regional interface with program office and other associate program managers throughout the implementation phase. After implementation of the CAEG system in each region and center, the policy, budget, and interface functions of the APM will transition to the CAEG system manager. The CAEG system manager will be responsible for operation, maintenance, and training of the complete regional CAEG system as a continuous functional unit. Some specific position requirements of the system manager are:

a. Implements regional plans concerning changes, enhancements, and applications.

b. Coordinates operations, maintenance, and training with contractor(s).

c. Participates in working groups and management groups for the establishment of both operational and technical policies.

d. Coordinates with other regional representatives concerning all facets to support and operate a regional CAEG system.

e. Oversees and manages general operation of the system including:

(1) Running diagnostic tests and documenting problem areas.

(2) Loading and testing software and software updates.

(3) Liaison with users concerning system matters.

(4) Managing backup procedures and housekeeping tasks.

(5) Overseeing and managing hardware configurations.

f. Maintains contact and close working relationships with other regional system managers to permit exchange of useful information.

g. Assumes specific national program development functions in solving system problems, implementing applications, and managing expansions. The resources at the program office have been included in AAF-4's staffing requirements.

56. PLANNING AND REPORTS. The list of references that follow are referred to throughout the remainder of this order and with the plan constitute the relevant set of documents germane to the FAA's CAEG Program:

a. FAA's Comprehensive Graphics Plan, May 1983.

b. FAA CAEG and Evaluation Report, November 1985.

c. Program Implementation Plan (PIP) for Pilot Computer Aided Designs (CAD) Program, November 1984.

d. FAA CAED Cost Effectiveness Study, Final Report, DOT-TSC-FA648-85-9, November 1985.

e. Engineering Graphics System Specification Prospectus, September 25, 1985.

f. Source Selection Plan for CAEG Systems, SP No. 01-86.

g. FAA CAEG System Configuration by Region, September 30, 1985.

h. FAA CAEG Memorandum from James R. Etgen (AES-2), with attached CAEG Background Paper, October 3, 1985.

i. CAEG Systems Requirement Specification, November 1985.

j. Training Requirements for Computer Aided Engineering Graphic Systems to be Acquired by the FAA, November 1985.

k. CAEG Management Plan and Graphics Issues Paper, prepared by Graphics Working Group, March 1985.

l. CAEG Management Report, June 1986.

57. APPLICABLE DOCUMENTS.

- a. National Airspace System (NAS) Plan, April 1985.
- b. FAA Information Resource Management Plan (IRMP).
- c. FAA Source Selection Regulation, SP No. 01-86.
- d. Order 1800.8E, National Airspace System Configuration Management, July 1985.

58.-59. RESERVED.

## CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. Project funds are allocated to fiscal years and to organizations. Current funding by fiscal year is as follows:

- a. FY-1988 - Funding available to purchase five basic systems which consists of 10 to 12 workstations for each system.
- b. FY-1989 - Funding requested to purchase four basic systems consisting of 10 to 12 workstations for each system plus expansion of all nine systems to 15 to 23 workstations for satisfaction of total requirements.
- c. FY-1990 - Unknown at publication time. Additional funds are requested to provide a CAEG system for the Aeronautical Center that will satisfy the total requirements. Actual dollar figures are under the control of the AAF-4B Program Office.
- d. Funding does not include personnel costs.

61. CONTINGENCY PLAN. The intentions of this order can be thwarted or side-tracked by events, situations and management dictates outside the control of the program office and its management. The purpose of this paragraph is to identify some things that could happen and to specify the program office's plan for such events.

- a. Funding cut. If modest, adjust scope of first and second tiers in the CAEG configuration hierarchy. If severe, push implementation schedule to a later fiscal year and "fight" for increased FAA commitment based on the significance of the benefits to be realized. Also, continue to improve assessments of benefits realized through the pilot systems.
- b. Contract Cost Surprises. Adjust configuration level of first and second tier in system hierarchy through use of contract options.
- c. Source Selection Delays. For main system buys, accelerate second tier configuration option decision. For application software, use TSC and other internal resources more extensively.

62.-69. RESERVED.



## CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. The basic CAEG system will be divided into sections for installation at the regional office facility. One section will contain a central processing unit, main memory, system console monitor, disk drives, and associated hardware and will be located in the existing computer room. The remaining sections may be located in workrooms or at individual workstations. The printer and plotters will also be distributed in the workrooms or workstations as applicable. The level IV and V workstations as described in the specification may be located on existing desktops.

a. The contractor will survey and prepare sites and install the system(s) as dictated by survey and preparation results and by contractual requirements. Installation shall be planned to satisfy requirements specified in the regional implementation plans.

b. Model design base and software standards will be provided by the program office and supplied to each location before the system is operational.

c. A plan for relocating existing pilot systems will be provided to the affected regions, the centers, and headquarters under separate cover.

d. Application software, functional usage tables, and hardware deployment by region are included in the specification.

71. SITE PREPARATION. Site preparation encompasses facility, organization, personnel, contractor support, and operating issues. Both short- and long-term consideration must be given to each of these issues. Anticipated problems and unique regional considerations must be identified and resolved. Once the contractor has surveyed and prepared the site for installation, each APM will integrate the resultant data into the framework of the Regional Implementation Plan (RIP) which will provide the following information as a minimum:

a. Receiving Point. Identify the receiving point for the components of each region's CAEG system.

b. Facility Plans. Address the facility issue for each region's CAEG system. Identify where the systems will be installed (building, room, department area, etc.). As a minimum, provide details on the following preparations.

(1) Plan space for the CAEG system.

(2) Provide dimensioned floor plans denoting planned location of each workstation, computer, and printers/plotters.

(a) State ceiling heights.

- (b) State doorway dimensions.
  - (c) Describe floor type (e.g., 9-inch raised computer floor).
  - (d) Ensure appropriate electrical power is available to include voltage/amperage. If additional circuits/receptacles are required, plan to submit necessary work orders.
    - 1. Show location, type, and number of receptacles on floor plan.
    - 2. State voltage/amperage of each.
  - (e) Ensure appropriate air conditioning is available for CPU, workstations, and peripherals.
  - (f) On the floor plan show the location, number, and relative distance between workstations. Appendix 1, Typical CAEG Program Requirements, describes the system requirements.
  - (g) Plan approximately 200 square feet of space for a CPU, two disk drives and one tape drive in the computer room and approximate space for tape and disk storage.
- (3) Identify and provide plans for any site preparation required to ready the facility. Provide construction drawings for proposed alterations if they can be determined based on current information. A minimal amount of funds are available from the CAEG Program Office for critical site preparation. Tasks that may utilize these funds are only those without which the system cannot be rendered operational.
- c. Organization and Personnel Plans. Address the organizational roles of the CAEG Program personnel prior to, during, and after installation.
- (1) Provide an organization chart.
  - (2) Define the role of the regional APM prior to and after installation.
  - (3) Assign CAEG operational management responsibility and accountability to a specific organization within the region. A responsible manager of the system must also be named. The system manager/administrator must be qualified to schedule the system's resources, interface with vendors, prioritize applications and user requests, enhance the system through the procurement of additional capabilities such as special application software and/or more workstations, manage an inhouse training program, and so forth. (Specific requirements of the system manager were previously described in paragraph 55.)

(4) Plan interfaces with the CAEG Program Office and the other regions to ensure communications and to gain the experience benefits of other users in the FAA. A national user group and regional user groups will be created. Such groups will have a positive influence on the training program for CAEG by improving communications nationally and locally. Address the creation of regional user groups, designate chairpersons, and charter the activities.

(5) Tailor the organizational roles and duties of all the region's potential users from the use of national guidelines. The regional plan should address the:

(a) System utilization; who are the users; when are the utilization periods; and what type utilization is planned.

(b) Transition of personnel from the old methodology (hand drawn) to the new (automation), including the timeframe.

(c) Regional unique personnel issues bearing on the success and full implementation of CAEG in the region.

(6) Address requirements for the CAEG system operation to include daily power-up, shut-down, back-ups to include on-site and off-site storage, tape mounting, and tape/disk library support. In most regions a contractor currently performs this function for other regional mainframe computers, therefore, it would be appropriate to integrate required CAEG operations support into existing contracts. The contractor activities will be under the direction of the CAEG system manager. Written instructions will be developed between the system manager and contractor representative with supplemental verbal direction as daily conditions dictate. If necessary, the CAEG Program Office will assist with funding for CAEG operation for the first year. Additional expense should be minimal since existing assets will be used in most cases.

(7) Computer Aided Engineering Graphics system maintenance will be provided by the contract. The hardware contract will contain provisions for maintenance that may be optioned in 1-year increments for up to 5 years. For the first year the program office will fund maintenance services on the CAEG system. After the first year it will be up to the region to fund maintenance services either through existing contract options or through a maintenance service provider of their choice.

d. Training Plan. Planning and budgeting for training must be accomplished. A primary duty of each APM is to ensure that initial training is adequately planned. Realization of the productivity improvements and realizing maximum benefits depends almost wholly on the region's commitment to training and widespread use of their CAEG system.

Each region is encouraged to look toward the long term. Sacrificing short-term returns in order to improve overall long-term organizational productivity is the path to maximizing CAEG system benefits. In addition to the generic training provided by hardware manufacture and software developers, training will be required in the use of FAA operational procedures, modeling concepts/data base usage, and specific application software developed by FAA. To provide consistency of inhouse training, it is proposed that the initial classes be conducted on a multiregional level with subsequent classes conducted at a regional level.

(1) Develop a plan to meet the CAEG Program's near term training objectives, in accordance with FAA Standard 028, Contract Training Programs. The initial CAEG procurement requires the selected contractor to provide system training. Seven training categories have been identified as cited in the CAEG RFP. Paragraph 91c is a detailed description of those categories. The course dates and locations will be established at contract award.

(a) Identify appropriate personnel for the various categories of the CAEG system training supplied by the contractor. The contractor will be the primary source for training in all categories except management overview specified in paragraph 71d(3). Prepare a preliminary schedule specific to each region for training. Training in some categories will commence immediately after contract award and before any systems are installed. It is necessary to start early because it will not be possible to train everyone at one time. Therefore, a series of classes in each category are required over the period starting with contract award until all personnel in each category have completed the training.

(b) Prepare budget for per diem and travel. The program office will fund initial training for a base number (core) of regional personnel to include course cost, travel, and per diem. Additional follow-on training will be a regional responsibility and may be accomplished inhouse or by contract.

(2) Develop a 5-year training plan for the CAEG Program in the region. Although the national procurement will provide each region with specialized training in each of the categories, the region has the major responsibility of continuing the training effort after the system is installed and operating. In addition the region has the responsibility of continuously assessing and improving the skill level of its organization in the CAEG arena.

(a) Plan for attrition training. Employee turnover presents a constant need to train new personnel if the FAA and each region are to realize the projected productivity gains. The data to date, obtained through the pilot installations, strongly indicate that adequately experienced and trained personnel are an absolute must for CAEG success in any environment.

(b) Plan for training on new software applications. The addition of special application software packages will require initial and ongoing training. Again, any national procurement of application software will include initial training by the contractor. However, regional management must prepare and commit to the long-term training needs of the organization. CAEG systems require different skills and must be acquired through training or through experienced new hires.

(3) The CAEG Program Office will provide management overview training to each region. Management overview training is necessary in order to ensure continuity throughout the FAA, in order to project an FAA-wide vision of the program, and in order to address FAA unique problems which will confront regional management. The contractor may also be requested to supplement training in this category, however, the program office will be required to integrate such efforts into its overall management training undertakings. The primary objective of the management overview training class is to inform management of the opportunities that will surface with their CAEG system, to provide guidance about how to make their system become productive, and to provide leadership in the transitioning process. Initial management overview training should commence once the regional implementation plan/site survey has been submitted and approved. The program office will be required to prepare the course material and schedule it with each region.

e. Maintenance Plan. The contractor chosen to provide the core CAEG systems will be tasked through his/her contract to maintain the hardware and software he/she has installed. The first year of maintenance costs will be paid through program office funds and thereafter maintenance becomes the financial responsibility of each region. Options are contained in the contract for continued maintenance for the 5 years of system operation. Each region may make its own decision as to how maintenance is to be provided after the nationally funded first year expires. This could be through extensions to the national contract, through another source, and conceivably a given region may opt to do its own maintenance since they must foot the bill and live with the system.

(1) As is the case for all computer-based systems, maintenance requirements are a function of system use and criticality of availability. This order assumes that at least one shift system availability must be maintained at a high level. Thus the repair personnel must be available on call during this prime shift period (8 a.m. to 5 p.m.). Since hardware and software maintenance problems are vastly different, it is unlikely that the contractor can provide total system maintenance services through a single individual at each site. The contract contains options to allow for additional maintenance during other than prime shift at additional cost. Regional funding will be required for maintenance after 3 months warranty plus twelve (12) months post warranty to be funded by program office.

(2) No modification will be made to any CAEG hardware/software without approval of the program office within configuration management constraints. Major software revisions shall be funded and purchased by the regions subject to configuration coordination and approval through the program office.

f. Regional Implementation Plan (RIP). A completed RIP will be provided to the program office and become an addendum to this order. The RIP should take a form similar to the model/example as provided by the program office.

72. DELIVERY. The contractor will deliver CAEG system hardware, software, training, and documentation in accordance with the times and locations specified in figure 7-1, CAEG Hardware/Software Delivery Schedule.

FIGURE 7-1. CAEG HARDWARE/SOFTWARE DELIVERY SCHEDULE

a. CAEG Hardware/Software

<u>SYSTEMS NO.</u>	<u>REGIONAL/LOCATION</u>	<u>DAYS AFTER CONTRACT AWARD</u>
1	New England Region (ANE) Burlington, MA	90
2	Southwest Region (ASW) Forth Worth, TX	120
3	Northwest Mountain Region (ANM) Seattle, WA	150
4	Western Pacific Region (AWP) Los Angeles, CA	180
5	Eastern Region (AEA) Jamaica, NY	210
<u>OPTIONAL SYSTEMS - BASIC CONFIGURATION</u>		<u>DAYS AFTER OPTION EXERCISE</u>
6	Central Region (ACE) Kansas City, MO	90
7	Great Lakes Region (AGL) Des Plaines, IL	120
8	Alaskan Region (AAL) Anchorage, AK	150
9	Southern Region (ASO) Atlanta, GA	180

FIGURE 7-1 CAEG HARDWARE/SOFTWARE DELIVERY SCHEDULE (Cont.)

<u>EXPANDED CONFIGURATION</u>		<u>DAYS AFTER OPTION EXERCISE</u>
1	New England Region (ANE) Burlington, MA	90
2	Southwest Region (ASW) Forth Worth, TX	90
3	Northwest Mountain Region (ANM) Seattle, WA	90
4	Western Pacific Region (AWP) Los Angeles, CA	90
5	Central Region (ACE) Kansas City, MO	90
6	Eastern Region (AEA) Jamaica, NY	90
7	Great Lakes Region (AGL) Des Plaines, IL	90
8	Alaskan Region (AAL) Anchorage, AK	90
9	Southern Region (ASO) Atlanta, GA	90

b. CAEG System Software (Basic and Optional Quantities). Will be delivered concurrently with system hardware.

c. Training. The following training is required for each CAEG system (firm and optional) and, for delivery purposes, will be furnished in accordance with the training schedule proposed by the contractor and negotiated between the contractor and FAA. The negotiated training schedule will be incorporated into the contract by specific reference prior to contract award.

- (1) Management orientation training.
- (2) Workstation operator training.
- (3) System technical/support training.
- (4) System programmer training.

- (5) System management training.
- (6) Data management training.
- (7) Advanced applications software training.
  - (a) Integrated interactive software.
  - (b) Basic interactive graphics 2D/3D.
  - (c) Mechanical engineering.
  - (d) Structural engineering.
  - (e) Civil engineering.
  - (f) Electrical engineering.
  - (g) Architectural.
  - (h) Electronic design.
  - (i) Finite element modeling.

d. Training Documentation.

(1) Student texts appropriate to the course of instruction will be provided to each student at the time that training is conducted.

(2) Three (3) complete sets of training documentation (i.e., three sets of all training manuals for every course conducted) will be delivered F.O.B. Destination to:

DOT/Federal Aviation Administration  
ATTN: Computer Graphics Contracting Officer's Technical  
Representative  
800 Independence Avenue, SW.  
Washington, DC 20591

(3) One (1) complete set of training documentation (i.e., one set of all training manuals for every course conducted) will be delivered F.O.B. Destination to each FAA Regional Headquarters.

(4) Training documentation will be delivered in accordance with the delivery schedule proposed by the contractor and negotiated between the contractor and FAA.

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e. Technical Documentation.

(1) Three (3) complete sets of technical documentation will be delivered F.O.B. Destination to:

DOT/Federal Aviation Administration  
ATTN: Computer Graphics Contracting Officer's  
Technical Representative  
800 Independence Avenue, SW.  
Washington, DC 20591

(2) Two (2) complete sets of technical documentation will be delivered F.O.B. Destination to each FAA Regional Headquarters.

(3) Time of delivery for technical documentation will be ninety (90) days after contract award for 7(a) and at time of system installation for the remainder.

(4) For all of the technical documentation delivered hereunder, the contractor will provide a notice of delivery to the contracting officer:

DOT/Federal Aviation Administration  
ATTN: ALG-311 (SJH)  
800 Independence Avenue, SW.  
Washington, DC 20591

f. Maintenance. Will be performed at the affected CAEG system site as required.

g. Evaluated Optional Features. Evaluated optional features, which may be exercised at the option of the FAA and which consist totally of software, will be delivered concurrently with the CAEG system hardware.

h. Period of Performance. Inclusive of any options exercised by the Government, the period of performance for the contract will not extend beyond the sixtieth (60) month after date of contract award.

73. INSTALLATION PLAN. Physical installation will be accomplished by CAEG contractor personnel except for cabling. The contractor will provide all cabling/connectors etc., and will make the physical connections; however, regions will arrange for installation of contractor provided cabling. The CAEG contractor will be able to survey the intended installation site(s) and make recommendations relative to site-preparation activities.

74. RELOCATION PLAN. Physical relocation and installation of the pilot systems will be accomplished by FAA with funding provided for shipment, installation, and training by the program office. A relocation plan is presently being developed by the program office as provided for in this PIP.

75.-79. RESERVED.



## CHAPTER 8. VERIFICATION

80. FACTORY TESTING. There are two levels of factory testing; First Article Test and Factory Acceptance Test. The contractor will verify all requirements identified in section 3 of specification FAA-E-2771 according to the Verification Requirements Traceability Matrix (VRTM). Both tests are conducted after contract award. The contractor will submit a detailed test plan for each test to the FAA for approval. Both tests will be conducted by the contractor with FAA personnel observing.

a. First Article Test (FAT1). This level of verification is accomplished at the contractor's facility. The intent is to verify the existence of all the capabilities described in the CAEG contract. The system under test will be the equipment that will be delivered to the FAA's New England Region as contained in FAA-E-2771, Table 3.3.1-5, Basic Hardware Configuration. This test will be the most detailed of the two.

b. Factory Acceptance Test (FAT2). Each system will be tested at the contractor's facility prior to delivery to the specified FAA site. This test will be in less detail than the First Article Test.

81. INSTALLATION AND CHECKOUT (I/CO). Installation and checkout test and evaluation (T&E) will be conducted on the CAEG system after delivery and inventory of the equipment. Test and evaluation will be performed to assess the suitability and verify the effectiveness of the contractor's installation and checkout procedures. Installation and checkout procedures will be proposed by the contractor and will undergo an engineering review by the FAA. The I/CO will include:

- a. Verification of hardware electrical and mechanical interfaces.
- b. Verification of system performances.
- c. Verification of hardware/software diagnostics.
- d. Verification of maintenance capability.
- e. Verification of support hardware/software adequacy.

82. CONTRACTOR INTEGRATION AND TESTING. There are no interfaces with this project from outside the CAEG system.

83. CONTRACTOR ACCEPTANCE INSPECTION (CAI). Contractor acceptance inspection will be done coincidentally with the checkout since this project is composed of only commercially available equipment.

84. SHAKEDOWN AND CHANGEOVER. The CAEG system shakedown and changeover activity will occur after the contractor completes Factory Acceptance Testing and Installation and Checkout T&E. Shakedown testing will be conducted for each regional CAEG site to verify the integrated readiness of personnel, procedures and the system to assume field operational status. The shakedown will focus on determining and correcting site specific problems. Finally, the shakedown will culminate in the operational readiness demonstration (ORD) of CAEG hardware, software, and operating staff prior to completion of the acceptance inspection.

a. Shakedown testing will include but is not limited to the following:

- (1) Review of all delivered system documentation.
- (2) Complete checklist of scheduled deliveries/inventory.
- (3) Monitor demonstration of specified equipment performance.
- (4) Monitor unit/subsystem software operability.
- (5) Monitor system loading testing.
- (6) Monitor environmental testing.

b. As part of the shakedown testing, there will be an ORD to inspect the following operational, maintenance, and engineering areas.

(1) Final refinement of operating procedures, methods, adaptation, and parameters.

(2) Verification that the basic cadre of personnel meet basic operations requirements and that the training program is available to familiarize regional personnel with the system functions and equipment.

(3) Verification that the required contract for maintenance is valid for 1 year to allow the region sufficient time to develop a maintenance plan for the remainder of the system's life.

(4) Verification of real property records in accordance with Order 4660.1, Real Property Handbook, Chapter 9, Sections 2 and 3.

85. ACCEPTANCE INSPECTION. Before a region's CAEG system is accepted for maintenance and operation as an operational facility in support of the NAS, there will be an Acceptance Inspection. In general the following is planned.

a. As the final step in the formal acceptance of the CAEG system, the shakedown and changeover will be completed before the acceptance team is convened. The team will have full authority to determine the conditions of the CAEG system acceptability in accordance with the established standards and specifications. This team will consist of, but not be limited to, representation from each of the following:

(1) The FAA headquarters office responsible for project implementation, AAF-4B, and its designees (i.e., members of the technical evaluation team, GWG, and/or GEC).

(2) The regional office organizations responsible for project implementation. The CAEG APM will act as chairperson of the team and will be responsible for preparation of the team report.

(3) The following regional office organizations shall be represented as a minimum.

- (a) Airway Facilities.
- (b) Management Systems or Resource Management.
- (c) Air Traffic.
- (d) Airports.
- (e) Flight Standards.
- (f) Aircraft Certification.
- (g) Logistics.

b. The team chairperson will, after notification by the CAEG Project Office, convene the acceptance team and give a notice stating the time, date, and place the acceptance inspection will commence. An acceptance inspection will be accomplished as follows.

(1) One copy of all contract documents will be furnished to the CAEG APM prior to the start of work on the CAEG project at the respective regional site.

(2) The team will inspect and evaluate the CAEG system installation to determine that the CAEG system:

(a) Has been established in accordance with specifications, agency installation standards and criteria, and all applicable safety codes.

(b) Has been properly installed, integrated, and adjusted.

(c) Adequately provides for maintenance needs; i.e., tools, test, operating and working equipment, documentation, accurately updated property records, facility supply inventory of spare parts and other required support material, maintenance procedures, standards and tolerances.

(3) Major emphasis will always be placed on determining whether the CAEG system can be maintained in a reasonable and efficient manner and will provide the operational service for which it is intended within established standards and tolerances.

(4) All test data and one copy of all instruction manuals, preliminary or final, furnished with the equipment will be delivered to the CAEG APM at the conclusion of the acceptance inspection.

(c) At the conclusion of the inspection, the regional CAEG APM will formally accept the system. Exceptions to be worked out will not derogate maintainability, reliability, or operational services to the extent that the CAEG facility cannot be used to satisfy its intended functions properly. Where exceptions exist that the CAEG facility cannot be used to provide the intended function, such exceptions will be clearly defined and clearing action initiated as a prerequisite for the acceptance and assumption of maintenance responsibility. A report will be prepared in any case. This report will provide a documented basis for acceptance of the CAEG system. The CAEG APM will be responsible for the preparation and distribution of the report. Preparation will be given high priority and will be completed prior to or concurrent with the acceptance of the CAEG system.

86.-89. RESERVED.

## CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90. MAINTENANCE CONCEPT.a. Responsibilities of the Contractor.

(1) The contractor will provide maintenance (labor and parts) and will keep the equipment in good operating condition. Maintenance service will not include electrical work external to the equipment, the furnishing of supplies, and adding or removing accessories, attachments or other devices. It will not include repair of damaged equipment resulting from transportation between FAA sites, neglect, misuse, failure of electrical power, of air-conditioning or humidity control, or causes other than ordinary use. The contractor chosen to provide the core CAEG systems will be tasked through the contract to maintain the hardware and software that has been installed. The first year of maintenance costs will be paid through program office funds and thereafter it becomes the financial responsibility of each region. Inclusive of any options exercised by the FAA, the period of performance for the contract will not extend beyond the sixtieth (60) month after date of contract award. Maintenance cost for the relocated pilot systems must be furnished by the receiving organization beginning FY 1990 and negotiated under separate contract.

(2) The principal period of maintenance will be 8 a.m. to 5 p.m., Monday thru Friday, excluding observed Government holidays.

b. Responsibilities of the FAA.

(1) FAA personnel will not perform maintenance or attempt repairs to equipment while such equipment is under the purview of the contract unless agreed to by the contractor.

(2) The FAA will provide adequate storage space (for spare parts) and working space that will include heating, lighting, ventilation, electrical outlets, and telephones for the use of maintenance personnel (local calls only). These facilities will be within a reasonable distance of the equipment to be serviced and will be provided at no charge to the contractor.

(3) The FAA will provide time for contractor-sponsored modifications within a reasonable time after being notified by the contractor that the modification is ready to be made. The time required to make the modification will be outside the principle period of maintenance hours.

(4) The FAA will maintain site requirements in accordance with the equipment environmental specifications furnished by the contractor.

c. Preventive Maintenance. Preventive maintenance may be performed during the principal period of maintenance. Preventive maintenance will be in accordance with the contractor's proposed maintenance plan as negotiated and accepted by the FAA. The quality of preventive maintenance will be comparable to that provided by the contractor for identical leased equipment. If a mutually agreed upon schedule for preventive maintenance cannot be established, the FAA reserves the right to specify the schedule for performance of preventive maintenance, subject to the constraints above.

d. Remedial and On-call Maintenance.

(1) Remedial maintenance. The contractor will provide remedial maintenance service with 4 hours or less response time (8 hours or less for the Alaskan Region) during the principal period of maintenance. Remedial maintenance will be performed after notification that equipment and/or operating software is inoperative. The contractor will provide the FAA with designated point(s) of contact and will make arrangements to enable its maintenance representative to receive such notification or provide an answering service or other continuous telephone coverage to permit the FAA to make such contact. All labor and material to perform remedial maintenance shall be furnished by contractor for the monthly price per component as specified in the contract.

(2) On-call maintenance. Should the FAA require maintenance service outside the designated principal period of maintenance on an on-call basis, a response time of 6 hours or less is required (8 hours or less for the Alaskan Region). All labor and material to perform remedial maintenance shall be furnished by the contractor at an hourly charge as specified in the contract. Charges shall be for actual hours required.

e. Option to Extend the Principal Period of Maintenance. The FAA, by giving thirty (30) days written notice to the contractor, has the option to extend the principal period of maintenance, for any region, for the fixed charges set forth in the contract, in accordance with the following:

(1) Extended Principal Period of Maintenance Option I - Extends the principal period of maintenance to 12 consecutive hours.

(2) Extended Principal Period of Maintenance Option II - Extends the principal period of maintenance to 16 consecutive hours.

f. Malfunction Reports. The contractor will furnish a signed malfunction incident report to the system manager upon completion of each maintenance call. The report will include as a minimum, the following:

(1) Date and time notified.

(2) Date and time of arrival.

- (3) Type and Serial number(s) of machines.
- (4) Chargeable time spent for repair.
- (5) Description of malfunction.
- (6) Type of service provided.

g. System Alterations or Attachments.

(1) Should the Government make alterations or install attachments that affect the maintenance of this equipment, continuation of the maintenance service on this equipment will be subject to mutual agreement (including any optional expansions). Should the alterations or attachments increase the maintenance costs to the contractor, additional maintenance charges will be made on an individual installation basis. If such alterations or attachments create a safety hazard, the contractor may discontinue maintenance service on the hazardous equipment. In addition, should such alterations or attachments be the cause of malfunction or downtime, such downtime will not be creditable.

(2) Contractor-sponsored alterations or attachments to equipment will be made with the consent of the FAA. Appropriate modification of the contract will be negotiated for each such alteration which enhances the value of the system to the FAA or decreases the overall maintenance cost.

h. Maintenance Downtime Credits.

(1) Definition. Downtime is that period of time when the system or device is inoperative and workload can not be accomplished due to a malfunction in the contractor-supplied equipment or software, or the system or device is inoperative and workload can not be accomplished because the system or device is released to the contractor for maintenance services.

(2) Period of Downtime. Downtime shall commence at the time the Government contacts the contractor's maintenance representative at the designated point of contact or with the contractor's answering service or other continuous telephone coverage provided to permit the Government to make such contact. Downtime shall end when the system and/or machine/device is returned to the Government in operable condition, including operating software regeneration if required, and is ready to perform the workload.

(3) Maintenance Credit for System Downtime. If the system remains inoperative and cannot perform the work due to an equipment or software malfunction either for a period of 6 consecutive hours (10 consecutive hours for Alaska) or for more than 8 non-consecutive hours (12 non-consecutive hours for Alaska) during a twenty-four (24) hour period, the contractor shall grant a credit to the Government for each hour of downtime in the amount of one-half (1/2) percent of the Total Monthly Charges due under this contract;

however, no credit shall be due the Government for operating software malfunctions when (i) the malfunction is not attributable solely to the contractor-supplied software, or (ii) the Government has made any additions or alterations to or otherwise modified the operating software. The credit for system downtime shall be computed to the nearest half or whole hour. No credit shall accrue to the Government during those periods when the contractor is denied access to the equipment. No more than 1/30th of the total system monthly maintenance charge shall be credited to the Government per twenty-four (24) hour day.

(4) Maintenance Credit for Input/Output Device Downtime. If any input/output device(s) remains unusable due to an equipment and/or software malfunction for a period of 6 consecutive hours (10 consecutive hours for Alaska), or for more than 8 non-consecutive hours (12 non-consecutive hours for Alaska) during a twenty-four (24) hour period, the contractor shall grant a credit to the Government for each hour of downtime in the amount of one-half (1/2) percent of Total Monthly Charges due under this contract plus similar credits for any other machine(s) supplied under this contract not usable as a result of the malfunction. No credit shall accrue to the Government during those periods when the contractor is denied access to the equipment and the amount of credit granted under this paragraph for each device shall not exceed 1/30th of the Total Monthly charge for the device for any calendar day. Credit for equipment or software malfunctions shall be computed to the nearest half or whole hour. No credit shall be due the Government for operating software malfunctions when (i) the malfunction is not attributable solely to the contractor-supplied software or (ii) the Government has made any additions or alterations to or otherwise modified the operating software. During a period of downtime, the Government may use operable equipment when such action does not interfere with remedial maintenance. The credit provisions of this paragraph do not apply when paragraph 90h(3) is invoked for the system of which the input/output device is a part.

#### 91. TRAINING REQUIREMENTS.

a. General. The objectives of the training requirement specified in this paragraph are to enable the FAA to manage effectively and efficiently, operate, and use the hardware and software received as a result of this acquisition. Training will be conducted by qualified instructors, with training materials provided by the contractor. The contractor will conduct training in accordance with his/her commercially available courses, providing they meet the requirements and are acceptable to the FAA. For required training that is not commercially available, the program office will develop and conduct training in accordance with requirements previously stated in paragraph 7ld. Appendix 2, Initial Training Courses, lists the types of courses and the number of students per course by region.

b. Training Schedule. Training will be furnished in accordance with the training schedule proposed by the contractor, and negotiated between the contractor and the FAA. The negotiated training schedule will be incorporated into the contract by specific reference prior to contract award. The CAEG Program Office will provide each region with a schedule of contractor training and will negotiate training allocations with each region.

c. Basic Types of Training Required.

(1) Management Orientation Training. Management orientation training will provide a systems overview and will be tailored to meet the training needs of engineering managers who have little background in data processing and will include a detailed system overview, operation and capabilities of the system, and the discussion of management of CAEG operational environment. Orientation will also include the discussion of the software; its purpose and capabilities; system security; software and hardware maintenance; documentation; and training.

(2) Workstation Operator Training. Workstation operator training will include a presentation of the user's manual and detailed instructions in how to operate and execute all of the system's functions. This training will be sufficient to permit users to perform effectively the following tasks:

- (a) Establish an applications symbol library.
- (b) Produce non-dimensioned diagrams and drawings.
- (c) Manipulate drawing files and data bases.
- (d) Utilize basic system utility functions.
- (e) Use menus and output drawings.

(3) System Technical Support Training. Technical support training will be conducted using systems acquired under the contract. Upon completion of training, students will be able to handle aspects of systems operation. The following subjects, as minimum, will be addressed in the system technical support specialist training:

- (a) Overall structure of operating system.
- (b) Structure of the software and how to expand it.
- (c) Diagnostic testing and error analysis techniques.
- (d) Standard practices for installation of new releases of graphics and/or operating system software.

- (e) Techniques for reconfiguring the system.
- (f) Starting the system from a cold start.
- (g) Responding to a system operators message.
- (h) Loading and unloading removable media.
- (i) Techniques for backup and recovery of all files.
- (j) Restart techniques.
- (k) Orderly shutdowns of system.

(4) Programmer/Systems Analyst Training. Programmer/systems analyst training will be comprehensive enough to give students sufficient knowledge to use the system effectively. The following are representative areas to be covered:

- (a) Hardware characteristics, system relationships, and principles of operation.
- (b) System generation including dead start creation, configuration, implementation of software changes and new releases.

(5) System Manager Training. This training will be designed for personnel who manage the CAEG system on a day-to-day basis. As a minimum the following topics will be included: computer operating system, explanation of system commands, planning of work flow for maximum system throughput, preventive and routine maintenance, proper design and use of symbol libraries, theory of programming, and the incorporation of special graphic applications programs into the system.

(6) Data Management Software Training. This training will enable personnel to use the software. As a minimum, the user should be taught how to create data sets that can be retrieved randomly and in sequence as defined by key elements. The user will be able to add or delete data elements and data sets.

(7) Advanced Applications Software Training. For each of the special applications software packages, the contractor will provide training for FAA personnel that will enable them to use the software effectively. Advanced applications software training will include indepth training in one or more application software packages (i.e., civil engineering, mechanical, structural, etc.).

d. Training Documentation.

(1) Training Plans. Training plans will specify, as a minimum, the number of hours proposed for each course, classroom versus workshop ("hands-on" training), and will provide an outline of each course. Training manuals and related training material will be included. The plan will also specify the location of training facilities (i.e., contractor's site, FAA location, or an interim site), a brief description of the equipment to be used, its similarities and differences with the CAEG equipment to be delivered under the contract, and the number of hours of equipment time to be provided at each CAEG system location for "hands-on" training.

(2) Training Manuals. Up-to-date sets of all training manuals, aids, publications, and other material to be used in training courses will be provided at least thirty (30) days prior to the first training session. Black and white hard copies of any slides, photographs, viewgraphs, or other transparencies will be provided. Films or television video tapes reproducible on normally available commercial equipment may also be provided.

(a) Complete sets of training documentation (i.e., all training manuals for every course conducted) will be delivered to each associate program manager.

(b) Each person attending a training class will receive a complete up-to-date set of all training manuals, publications, and other material used in that training class. All such classroom training materials will be delivered on or before the first day of the training class. Students will be allowed to retain all class materials.

92. SUPPLY SUPPORT.

a. Operating System Software Support. The operating system software required to make use of the equipment acquired under the contract will be provided and supported by the contractor. Operating system software refers to those routines that interface directly with hardware peripheral devices; and the computer operations, applications, and utility software programs. The support provided will consist of correction of errors, provision of contractor sponsored modifications, improvements, and revisions in accordance with subparagraph b.

b. Software Modifications and Revisions. The contractor will provide updated copies of any software changes and/or modifications made to software packages that have been purchased by the FAA. This will include full documentation of all contractor changes and/or modifications to software provided to meet FAA requirements. The FAA may or may not elect to accept the newer versions of software, and if accepted, software support will be provided by the contractor at no additional cost for the period of the contract. If

the FAA elects not to accept such later versions, the contractor will continue to correct any defects of operating software supplied under the contract. However, such obligation to correct defects will be limited to that necessary to permit the FAA to process the workload identified in the specification FAA-E-2771.

c. Availability of Additional Software. Any new software which the contractor announces, improves, or develops for general use with the type of equipment supplied under the contract, will be made available to the FAA at no less favorable basis than such software is provided to the contractor's commercial and other Government customers. Any reprogramming or additional equipment required to accommodate such later purchases will be at the FAA's expense. The delivery date and price will be mutually agreed upon by the contractor and the FAA.

93. VENDOR DATA AND TECHNICAL MANUALS. The contractor will furnish reference manuals, user manuals, and publications for all software and hardware provided under the contract. Three complete sets of technical documentation will be delivered F.O.B. Destination to the CAEG Program Office. Two complete sets of technical documentation will be delivered F.O.B. Destination to the FAA regional headquarters.

a. Types of Documentation Required.

(1) System Software Manuals. These manuals will describe the operating system(s), communications interface error diagnostics, on-line monitoring, etc., in sufficient detail to allow qualified FAA personnel to monitor and report problems with the operating system and communications systems/software to the contractor. Comparable documentation will be included for all programming language compilers, system support software, utilities, graphics, and the common data storage system(s) provided by the contractor. The contractor will provide the documentation required to implement, maintain, and control the procedures for systems security.

(2) Job Control Language Reference Manuals. The contractor will provide a manual (or set of manuals) describing and illustrating all job control language capabilities and operations. The manual(s) will be comprised of all systems control statements, systems diagnostics or error messages, system utilities, etc. An easy reference manual covering a summary of the job control language will also be provided as part of this requirement.

(3) Programming Reference Manuals. Special applications software programmers reference manual(s) will be provided specifically for users of special application software.

(4) Terminal Operations and Workstation User's Manuals. Terminal operations and workstation user's manuals will be used by FAA personnel from widely varying functional disciplines, and should be written and maintained at a level suitable for technicians.

(5) Specialized Software Manuals. The specialized software manuals will include complete instructions on the use of the specialized software package(s) provided by the contractor.

(6) Installation (site specific) Manuals. These reference manuals will provide complete instructions for total site preparation and will identify system installation requirements.

b. Amendments, Updates, and Revisions. The contractor will notify the FAA as soon as an amendment, update, or revision to the required reference manual or other documentation becomes available. This includes revisions or updates to manuals as a result of software updates. In turn, the FAA will specify its requirements, if any, for such document(s). Requirements for such updates will be satisfied promptly. The contractor will supply the amendments, updates, or revisions to the FAA on the same basis that such materials are provided to the contractor's commercial and other FAA customers.

c. Reproduction of Documentation. The FAA will have the right to reproduce (for internal use) all manuals, publications, and documentation subject to copyright laws.

d. Additional Documentation. Additional copies of manuals, publications, and documentation will be made available by the contractor throughout the period of the contract. Additional documentation ordered by the Government after the initial deliveries have been completed, as listed in paragraph 94c, will be at the expense of the FAA.

#### 94. EQUIPMENT REMOVAL.

a. In the event that the system(s) being maintained under the terms and conditions of the contract is moved to another location within the contractor's same geographical service area, as designated in the contractor's proposal, the terms and conditions of the contract will continue to apply. If the system(s) must be moved outside the contractor's designated service area, then the continued applicability of the contract's maintenance will be subject to mutual agreement of the parties.

b. The FAA will give at least sixty (60) days written notice to the contractor of its intention to move the equipment, except in emergencies.

c. Maintenance charges will be suspended on the day the dismantling of the equipment in preparation for shipment is completed. Maintenance charges will be reinstated on the day that the contractor begins reassembling the equipment. The FAA will be charged for disassembly and reassembly at the contractor's then current standard rates.

d. Shipment to the new installation site will be by padded vans (normally used to transport electronic equipment) or by air freight and will be at the expense of the FAA. The FAA may ship the equipment by FAA transportation, by commercial carrier, or, may provide the contractor with the authorization to ship by commercial carrier on a prepaid basis (where the FAA will be invoiced for transportation, rigging, and drayage costs).

95.-99. RESERVED.

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Appendix 1APPENDIX 1. TYPICAL CAEG PROGRAM REQUIREMENTS

<u>DESCRIPTION</u>	<u>Overall Dimensions (W x D x H)</u>	<u>Electrical</u>	<u>Environmental BTU/HR/WATTS</u>
<u>Computer</u>			
a. Central Processing Unit	<u>130" x 45" x 60"</u>	<u>120/220 VAC + 10%, 60 Hz + 1 Hz, 30 amp 3-Phase</u>	<u>20,000 BTU/HR, 6000 WATTS</u>
b. System Console Monitor/ Printer	<u>18" x 20" x 13" 28" x 24" x 34"</u>	<u>120 VAC + 10%, 60 Hz + 1 Hz, 15 amps</u>	<u>300 BTU/HR, 90 WATTS/ 1500 BTU/HR, 450 WATTS</u>
c. Spare Asynchronous Communications Ports	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
d. Spare Synchronous Communications Ports	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>Level I Workstation</u>			
a. Graphics Display	<u>48" x 42" x 75"</u>	<u>120 VAC + 10%, 60 Hz + 1 Hz, 15 amps</u>	<u>3000 BTU/HR, 850 WATTS</u>
b. Input Devices			
1. Alphanumeric Keyboard**	<u>see digitizing table</u>	<u>120 VAC + 10%, 60 Hz + 1 Hz, 15 amps</u>	<u>N/A</u>
		<u>120 VAC + 10%, 60 Hz + 1Hz</u>	

These requirements are representative and are for planning purposes only.  
Actual requirements will be determined at contract award.

Combined devices shall be acceptable.

1 - The digitizing table will accommodate the input devices.

Typical CAEG Program Requirements

<u>DESCRIPTION</u>	<u>Overall Dimensions (W x D x H)</u>	<u>Electrical</u>	<u>Environmental BTU/HR/WATTS</u>
2. Function Keyboard	see digitizing table	15 amps	N/A
3. Graphics/Function Input Device	see digitizing table	Power from display	N/A
4. Digitizing Table <sup>1</sup> (60" x 42")	70" x 48" x 52"	Power from display	20 BTU/HR, 6 WATTS

Level II Workstation

a. Graphics Display	43" x 57" x 62"	120 VAC + 10%, 60 Hz + 1 Hz, 15 amp	3000 BTU/HR 800 WATTS
b. Input Devices	<u>Integrated with the Graphics Display</u>		
1. Alphanumeric Keyboard			
2. Function Keyboard			
3. Graphics/Function Input Device			
4. Digitizing Table (34" x 22")			

These requirements are representative and are for planning purposes only.  
Actual requirements will be determined at contract award.

Combined devices shall be acceptable.

1 - The digitizing table will accommodate the input devices.

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Appendix 1

Typical CAEG Program Requirements

<u>DESCRIPTION</u>	<u>Overall Dimensions (W x D x H)</u>	<u>Electrical</u>	<u>Environmental BTU/HR/WATTS</u>
<u>Level III Workstation</u>			
a. Graphics Display	<u>19" x 23" x 18"</u>	<u>Same as Level II Workstation</u>	
b. Input Devices			
1. Alphanumeric Keyboard	<u>20" x 8" x 3"</u>	<u>Same as Level II Workstation</u>	
2. Function Keyboard			
3. Graphics/Function Input Device	<u>21" x 16" x 4"</u>	<u>Same as Level II Workstation</u>	
c. Worktable	<u>Standard Desk Table (i.e., 36" x 60")</u>		
<u>Level IV Workstation</u>			
a. Graphics Display	<u>18" x 20" x 13"</u>	<u>120 VAC + 10%, 60 Hz + 1 Hz, 15 amps</u>	<u>500 BTU/HR, 250 WATTS</u>
b. Input Devices			
1. Alphanumeric Keyboard	<u>20" x 8" x 3"</u>	<u>Powered by Display</u>	
2. Function Keyboard			
3. Graphics/Function Input Device	<u>21" x 16" x 4"</u>	<u>Powered by Display</u>	

These requirements are representative and are for planning purposes only.  
Actual requirements will be determined at contract award.

Combined devices shall be acceptable.

1 - The digitizing table will accommodate the input devices.

Typical CAEG Program Requirements

<u>DESCRIPTION</u>	<u>Overall Dimensions (W x D x H)</u>	<u>Electrical</u>	<u>Environmental BTU/HR/WATTS</u>
c. Dot Matrix Printer	<u>15" x 12" x 5"</u>	<u>120 VAC + 10%, 60 Hz + 1 Hz, 15 amps</u>	<u>350 BTU/HR, 100 WATTS</u>
d. Worktable	<u>Standard Desk Table (i.e., 36" x 60")</u>		
e. Fixed Hard Disk			
f. Diskette Drive	<u>Integrated with the Display</u>		
g. I/O Ports			
h. Modem			
<u>Level V Workstation</u>			
a. Display	<u>18" x 20" x 13"</u>	<u>120 VAC + 10%, 60 Hz + 1Hz, 15 amps</u>	<u>300 BTU/HR, 100 WATTS</u>
b. Input Devices			
1. Alphanumeric Keyboard	<u>20" x 8" x 3"</u>	<u>Powered by Display</u>	
2. Function Keyboard			

These requirements are representative and are for planning purposes only.  
Actual requirements will be determined at contract award.

Combined devices shall be acceptable.

1 - The digitizing table will accommodate the input devices.

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Appendix 1

## Typical CAEG Program Requirements

<u>DESCRIPTION</u>	<u>Overall Dimensions (W x D x H)</u>	<u>Electrical</u>	<u>Environmental BTU/HR/WATTS</u>
<u>On-Line Mass Storage Devices</u>			
a. Total Storage (million bytes)	<u>35" x 30" x 60"</u>	<u>208 vac + 10%, 60 Hz + 1 Hz, 20 amps</u>	<u>8000 BTU/HR, 2500 WATTS</u>
b. Removable Disk Units	<u>Included in Total Storage</u>	<u>Included in Total Storage</u>	
c. Removable Disk Packs			<u>400 BTU/HR, 120 WATTS</u>
d. Controller			
<u>Magnetic Tape Transports</u>			
	<u>35" x 30" 60"</u>	<u>120/220 VAC (no + 10%), 60 Hz + 1Hz 30 amp 3-phase</u>	<u>7000 BTU/HR, 2100 WATTS</u>
<u>Electrostatic Plotters (Monochromatic)</u>			
a. 11 inch width	<u>26" x 25" 26"</u>	<u>120 VAC + 10%, 60 Hz + 1 Hz 15 amps</u>	<u>1000 BTU/HR, 300 WATTS</u>
b. 24 inch width	<u>45" x 35" x 40"</u>	<u>115 VAC + 10%, 60 Hz + 1 Hz 30 amps</u>	<u>7000 BTU/HR, 2000 WATTS</u>
c. 34 inch width	<u>45" x 35" x 40"</u>	<u>115 VAC + 10%, 60 Hz + 1 Hz 30 amps</u>	<u>7000 BTU/HR, 2000 WATTS</u>

These requirements are representative and are for planning purposes only.  
Actual requirements will be determined at contract award.

Combined devices shall be acceptable.

1 - The digitizing table will accommodate the input devices.

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Typical CAEG Program Requirements

<u>DESCRIPTION</u>	<u>Overall Dimensions (W x D x H)</u>	<u>Electrical</u>	<u>Environmental BTU/HR/WATTS</u>
<u>Pen Plotter (Color)</u>			
a. 24 inch width	<u>43" x 22" x 47"</u>	<u>120 VAC + 10%, 60 Hz + <math>\frac{1}{2}</math> Hz 15 amps</u>	<u>600 BTU/HR, 200 WATTS</u>
b. 34 inch width	<u>74" x 25" x 64"</u>	<u>120 VAC + 10%, 60 Hz + <math>\frac{1}{2}</math> Hz 15 amps</u>	<u>3000 BTU/HR, 800 WATTS</u>
<u>Line Printer</u>	<u>30" x 25" x 36"</u>	<u>120 VAC + 10%, 60 Hz + <math>\frac{1}{2}</math> Hz, 15 amps</u>	<u>1600 BTU/HR, 500 WATTS</u>
<u>Color Graphics Film Recorder</u>	<u>24" x 11" x 36"</u>	<u>110/120 VAC + 10%, 60 Hz + 1 Hz 15 amps</u>	<u>800 BTU/HR, 250 WATTS</u>
Other (cables, connectors etc.)			

These requirements are representative and are for planning purposes only.  
Actual requirements will be determined at contract award.

Combined devices shall be acceptable.

1 - The digitizing table will accommodate the input devices.

APPENDIX 2. INITIAL TRAINING COURSES BY REGION

The following chart represents the initial training courses and number of students per course provided under the CAEG contract. Please note:

- a. Contractor may combine courses if software so organized.
- b. Basic Interactive/Graphics 2D/3D Software course is included in workstation operator training.
- c. Integrated Interactive Software can be included in other application training.
- d. Number of classes and class size can be proposed by contractor.
- e. The New England numbers also include Washington program office personnel.

Type of Training	Number of Students								
	ANE	ASW	ANM	AWP	AEA	ACE	AGL	AAL	ASO
1. Management Orientation	2	2	2	2	2	2	2	2	2
2. Workstation Operator	150	100	100	80	100	100	80	80	100
3. System Technical/Support	4	2	2	2	2	2	2	2	2
4. System Programmer	4	2	2	2	2	2	2	2	2
5. System Management	4	2	2	2	2	2	2	2	2
6. Data Management	6	5	5	5	5	5	5	5	5
7. Applications Software									
a. Integrated Interactive	-	-	-	-	-	-	-	-	-
b. Basic Interactive/ Graphics 2D/3D	-	-	-	-	-	-	-	-	-
c. Mechanical Engineering	6	4	4	4	3	3	3	3	4
d. Structural Engineering	5	3	3	3	3	3	3	3	3
e. Civil Engineering	6	4	4	4	4	4	4	4	4
f. Electrical Engineering	5	4	3	4	3	3	3	2	4
g. Architectural	6	6	4	4	4	4	4	4	4
h. Electronic Design	5	3	3	3	2	2	2	3	3
i. Finite Element Modeling	3	2	2	1	0	1	2	0	1





